

**Table 31-3** Treatment of Vitamin Deficiencies—cont'd

CLINICAL FEATURES		SUGGESTED DOSES
Pyridoxine (B <sub>6</sub> )	Seizures Drug-induced deficiencies Dietary deficiency	Neonates and infants: initial 50–100 mg/day orally, IM, IV, SC. Children: 10–50 mg/day as treatment, 1–2 mg/kg/day as prophylaxis. Adults: 100–200 mg/day as treatment, 25–100 mg/day as prophylaxis. Children: 5–25 mg/day for 3 wk, then 1.5–2.5 mg/day in a multivitamin product. Adults: 10–20 mg/day for 3 wk.
Riboflavin (B <sub>2</sub> )		Children: 2.5–10 mg/day in divided doses. Adults: 5–30 mg/day in divided doses.
Thiamine (B <sub>1</sub> )	Beriberi: critically ill  Beriberi: not critically ill Metabolic disease Wernicke encephalopathy	Children: 10–25 mg/day IM or IV. Adults: 5–30 mg/dose IM, IV tid, then 5–30 mg/day orally in a single or three divided doses for 1 mo. Children: 10–50 mg/day orally for 2 wk, then 5–10 mg/day for 1 mo. Adults: 10–20 mg/day orally. Adults: initially 100 mg IV, then 50–100 mg/day IM/IV until eating a balanced diet.
Cyanocobalamin (B <sub>12</sub> )	Nutritional deficiency  Anemia  Pernicious anemia   Hematologic remission Vitamin B <sub>12</sub> deficiency	Intranasal gel: 500 µg once a wk. Orally: 25–250 µg/wk. Give IM or deep SC; oral route not recommended because of poor absorption and IV route not recommended because of more rapid elimination. If evidence of neurologic involvement in neonates and infants (congenital), 1,000 µg/day IM, SC, for at least 2 wk, and then maintenance, 50–100 µg/mo or 100 µg/day for 6–7 days. If clinical improvement, give 100 µg every other day for 7 doses, then every 3–4 days for 2–3 wk, followed by 100 µg/mo for life. Administer with folic acid if needed (1 mg/day for 1 mo concomitantly). Children: 30–50 µg/day for 2 or more wk (total dose of 1000 µg) IM, SC, then 100 µg/mo as maintenance. Adults: 100 µg/day for 6–7 days; if improvement, administer same dose on alternate days for 7 doses, then every 3–4 days for 2–3 wk. Once hematologic values are normal, give maintenance doses of 100 µg/mo parenterally. No evidence of neurologic involvement: use intranasal gel: 500 µg per wk. Children with neurologic signs: 100 µg/day for 10–15 days (total dose of 1–1.5 mg), then 1–2/wk for several mo and taper to 60 µg/mo. Children with hematologic signs: 10–50 µg/day for 5–10 days, followed by 100–250 µg/day every 2–4 wk. Adults: 30 µg/day for 5–10 days, followed by maintenance doses of 100–200 µg/mo.
Ascorbic acid	Scurvy	Children: 100–300 mg/day in divided doses orally, IM, IV, or SC for several days. Adults: 100–250 mg/day one to two times/day.

Data from Lexi-Comp Inc., Hudson, Ohio, 2004; table from Kronel S, Mascarenhas: *Vitamin deficiencies and excesses*. In Burg FD, Ingelfinger JR, Polin RA, Gershon AA, editors: *Current Pediatric Therapy*, Philadelphia, 2006, Elsevier, Table 3, pp 104–105.

bid, Two times per day; CF, cystic fibrosis; IM, intramuscular; IV, intravenous; LBW, low birth weight; PO, by mouth; q, every; SC, subcutaneous; tid, three times per day; WHO, World Health Organization.

A variety of chemical forms of folate are nutritionally active. Folate functions in transport of single-carbon fragments in synthesis of nucleic acids and for normal metabolism of certain amino acids and in conversion of homocysteine to methionine. Food sources include green leafy vegetables, oranges, and whole grains; folate fortification of grains is now routine in the United States.

Folate deficiency, characterized by **hypersegmented neutrophils**, **macrocytic anemia**, and glossitis, may result from a low dietary intake, malabsorption, or vitamin-drug interactions. Deficiency can develop within a few weeks of birth because infants require 10 times as much folate as adults relative to body weight but have scant stores of folate in the newborn period. Folate is particularly heat labile. Heat-sterilizing home-prepared formula can decrease the folate content by half. Evaporated milk and goat's milk are low in folate. Patients with chronic hemolysis (sickle cell anemia, thalassemia) may require extra folate to avoid deficiency because of the relatively

high requirement of the vitamin to support erythropoiesis. Other conditions with risk of deficiency include pregnancy, alcoholism, and treatment with anticonvulsants (phenytoin) or antimetabolites (methotrexate). First occurrence and recurrence of **neural tube defects** are reduced significantly by maternal supplementation during embryogenesis. Because closure of the neural tube occurs before usual recognition of pregnancy, all women of reproductive age are recommended to have a folate intake of at least 400 µg/day as prophylaxis.

### Vitamin B<sub>12</sub>



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